

EXPERIMENTAL REGIME #2

Experimental regimes at the STA-1E Periphyton Test Facility are primarily defined by establishment of water depth, and residence time/hydraulic loading rate.

During Experimental Regime #2 (4-26-03 through 6-06-03) the following parameters were maintained in Cells 1, 2, and 4: Cell 3 kept idle, with peat soils difficult to establish calcareous periphyton

- **Water Depth – 12 inches (1.0 ft.)**
- **Input Flow**
 - **Cells 1 and 2 - 0.37 gallons/minute**
 - **Cell 4 – 0.74 gallons/minute**
- **Hydraulic Residence Time (HRT)**
 - **Cells 1 and 2 – 14 days**
 - **Cell 4 – 7 days**
- **Hydraulic Loading Rate (HLR)**
 - **Cells 1 and 2 – 2.12 cm/day**
 - **Cell 4 – 4.24 cm/day**

PHOSPHOROUS RESULTS

This section contains phosphorous concentration data collected during the period from April 26, 2003 until June 6, 2003. The objective during Experimental Regime #2 was to compare the impact of the three different substrates/substrate mixtures on phosphorous uptake and periphyton community composition. The three substrates compared were 1) Cell 1 contains a 12-inch Riviera Sand with a thin coating of water treatment sludge at a spreading rate of 4 in³/ft² (100 ft³/acre). 2.) Cell 2 contains a 12 inch blanket of crushed limestone, 3) Cell 4 contains a 6-inch blanket of crushed limestone overlaying a 6-inch blanket of peat soils. All substrates were subjected to the same nutrient levels and hydrologic regime.

Total phosphorous samples were collected using two distinct methods within the test cells: 1) compositing of 12 water samples per week collected by a time-paced autosampler and 2) transect grab samples collected down the center of each cell every 15 feet. Samples were also collected before entering the test cells using autosamplers and were composited on a weekly or biweekly basis depending on logistics. Two sampling points were available 1) water entering the site from the C-51 canal and 2) water flowing into the test cells after allowing for settling in pools containing water hyacinth. The feed to the PSTA test facility was drawn from the water hyacinth pools because the concentrations in C-51 is averaging at about 100 ppb with spikes of 1000 ppb TP.

INPUT

Week #	Sample Compositing Period	Location	Total Phosphorous (µg/l)
1/2	4/26/03-5/09/03	from C-51 canal	105
3/4	05/10/03-5/25/03	from C-51 canal	98
5/6	5/25/03-6/06/03	from C-51 canal	100
1	4/26/03 - 5/02/03	to test cells	NA
2	5/03/03-5/09/03	to test cells	72
3	5/10/03-5/17/03	to test cells	57
4	5/18/03-5/25/03	to test cells	72
5	5/26/03 - 5/31/03	to test cells	71
6	6/01/03-6/06/03	to test cells	72

CELL ONE

Substrate: 12 inches of Riviera Sand w/ Water Treatment Sludge (4 in³/ft²)

Water Depth: 12 inches

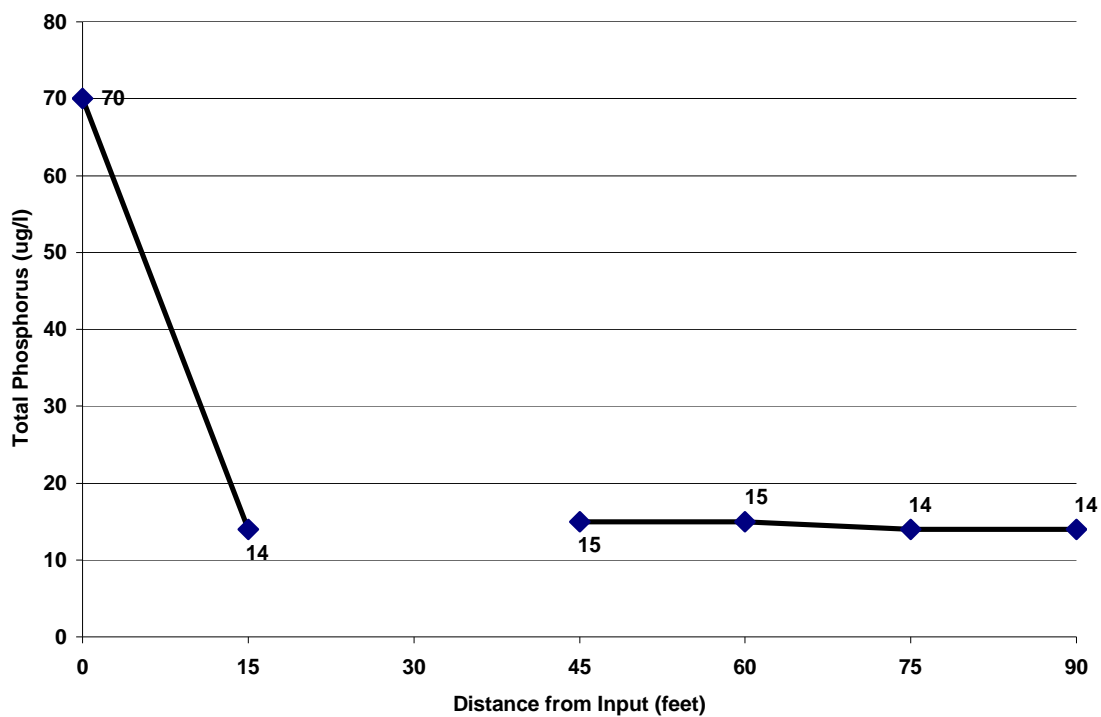
HRT: 14 days

HLR: 2.12 cm/day

Total Phosphorous Concentrations Composited from ISCO Autosamplers

Week #	Sample Compositing Period	Total Phosphorous (µg/l)
1	4/26/03 - 5/02/03	NA
2	5/03/03-5/09/03	16
3	5/10/03-5/17/03	33
4	5/18/03-5/25/03	26
5	5/26/03 - 5/31/03	21
6	6/01/03-6/06/03	28

Transect Phosphorous Concentrations in Cell One sampled on 6-06-03. Water was collected via grab samples every 15 feet along the centerline of the cell.



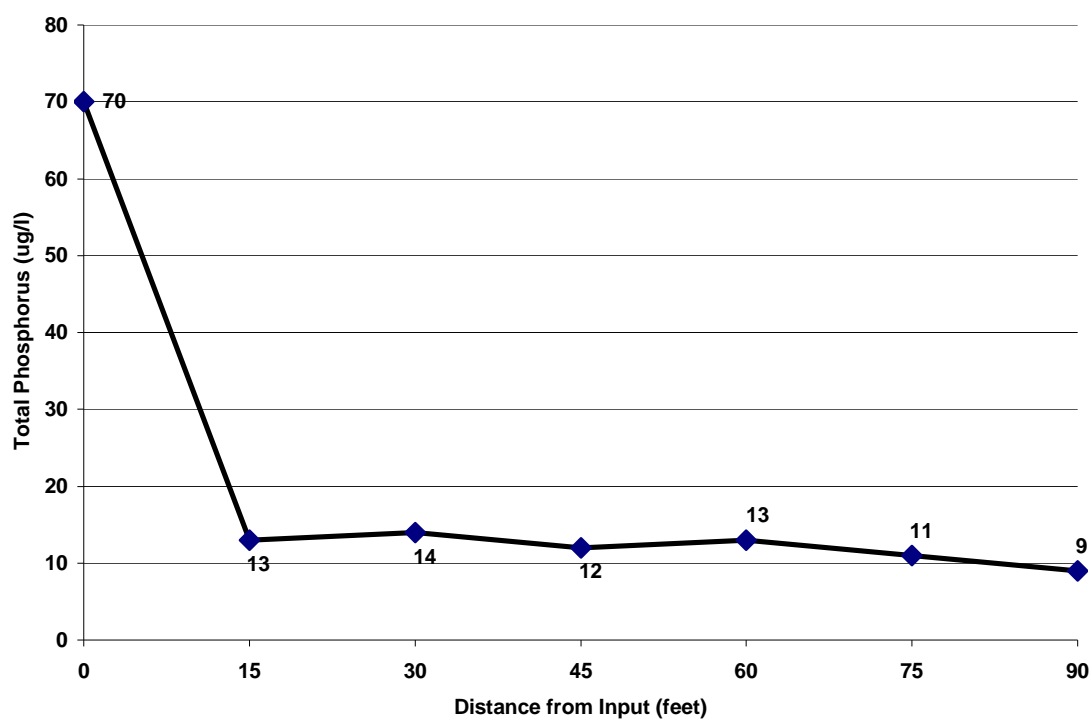
CELL TWO

Substrate: 12 inches of Crushed Limestone
Water Depth: 12 inches
HRT: 14 days
HLR: 2.12 cm/day

Total Phosphorous Concentrations Composited from ISCO Autosamplers

Week #	Sample Compositing Period	Total Phosphorous ($\mu\text{g/l}$)
1	4/26/03 - 5/02/03	NA
2	5/03/03-5/09/03	10
3	5/10/03-5/17/03	11
4	5/18/03-5/25/03	12
5	5/26/03 - 5/31/03	8
6	6/01/03-6/06/03	11

Transect Phosphorous Concentrations in Cell Two sampled on 6-06-03. Water was collected via grab samples every 15 feet along the centerline of the cell.



CELL FOUR

Substrate: 6 inches of Crushed Limestone above 6 inches of peat (High Organic Matter)

Water Depth: 12 inches

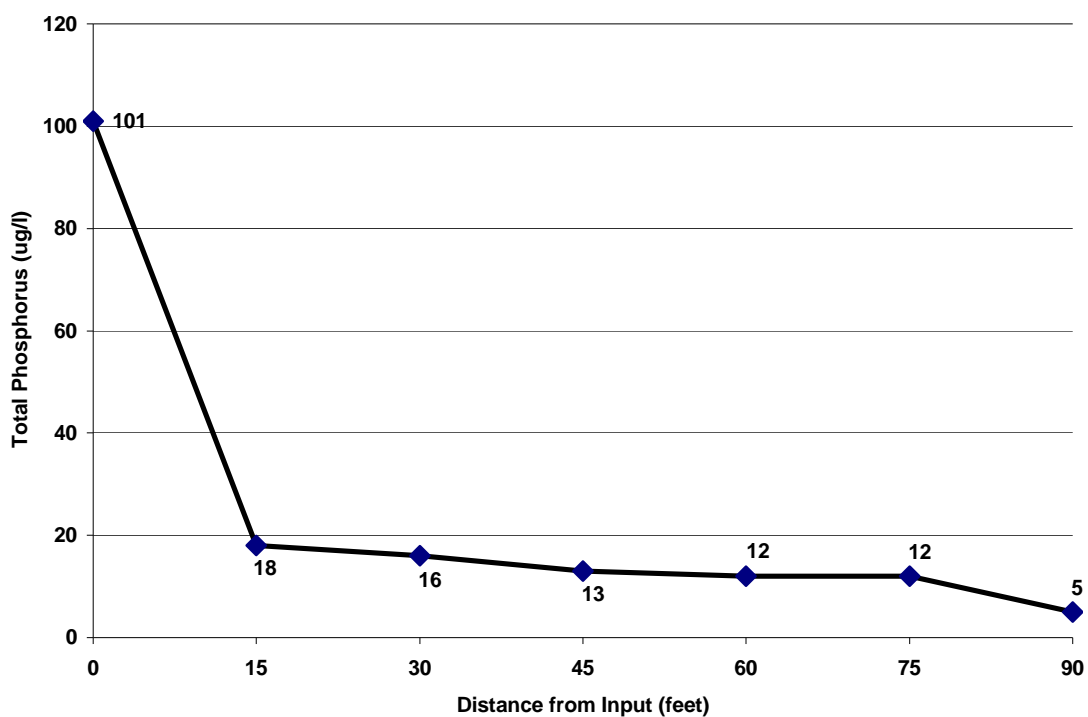
HRT: 7 days

HLR: 4.24 cm/day

Weekly Phosphorous Concentrations Composited from ISCO Autosamplers

Week #	Sample Compositing Period	Total Phosphorous (µg/l)
1	4/26/03 - 5/02/03	NA
2	5/03/03-5/09/03	6
3	5/10/03-5/17/03	12
4	5/18/03-5/25/03	11
5	5/26/03 - 5/31/03	10
6	6/01/03-6/06/03	7

Transect Phosphorous Concentrations in Cell Four sampled on 6-06-03. Water was collected via grab samples every 15 feet along the centerline of the cell.



CELL PHOTOGRAPHS

Four per page – I will include later as this would be too large to email....will be organized by date and location

ACTIVITY LOG

4-29-03

- Water Regime #2 Initiated
Cell 1

Water depth – One foot
Flow - .35 GPM
Residence Time – 14 Days

Cell 2

Water depth – One foot
Flow - .35 GPM
Residence Time – 14 Days

Cell 3

Dry

Cell 4

Water depth – One foot
Flow - .7 GPM
Residence Time – 7 Days

- Cells were filled to target depth utilizing the flow rates listed for each cell.
- Input flowmeters rinsed and cleaned

5-03-03

Water depth @ 1:00 PM

Cell 1 - .66 feet
Cell 2 - .66 feet
Cell 4 - .88 feet

5-05-03

Water depth @ 11:00 AM

Cell 1 - .66 feet

Cell 2 - .66 feet

Cell 4 - .88 feet

- Input flowmeters rinsed and cleaned

5-09-03

Water depth @ 12:00PM

Cell 1 - .82 feet

Cell 2 - .81 feet

Cell 4 - 1.0 feet

- ISCO samples collected

5-14-03

- Cells 1 and 2 reach one foot in depth at 2:00 PM
- Input flowmeters rinsed and cleaned

5-16-03

- Installation of insulation for Office initiated

5-23-03

- ISCO samples collected
- Wind vane replaced
- Flange on cell 4 upper valve replaced with cell 3 upper valve flange
- Cell 3 cattail removal initiated
- Sprayed malathion on water hyacinths to control weevil populations
- Input flowmeters rinsed and cleaned
- Additional holes drilled in upper flow strainers

5-26-03

- Problems occurred with several valves causing off-normal water levels.

Cell 1 – 1.17 feet

Cell 2 – 1.00 feet

Cell 3 – 0.00 feet

Cell 4 – 1.42 feet

- Water levels restored to normal levels and problems with valves resolved.

Cell 4 - Input flowmeter was discharging at 1.00 GPM.. Flowmeter cleaned and pipes flushed.

Cell 1 – Rapid growth of *Typha sp.*. Individuals over 2.5 feet tall. Continued expansion of *Bacopa sp.*

Distance from Input (feet)	Percent Cover of <i>Bacopa sp.</i>
0-5	0
5-10	5
10-15	1
15-20	>1
20-25	0
25-30	>1
30-35	0
35-40	2
40-45	20
45-50	>1
50-55	>1
55-60	>1
60-65	0
65-70	0
70-75	0
75-80	0
80-85	>1
85-90	0
90-95	0
95-98	0

Cell 2 – Continued colonization by *Chara* and sloughing of mat.

Distance from input (feet)	Size of <i>Chara</i>
7	Medium
14	Medium
55	Large
83	Small

90	Small
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Size definition – Small - up to 4 inch diameter; Medium – 4-7 inches in diameter; Large – 7-12 inches

Cell 4 – Contains no SAV or emergents

- Input water much cleaner than seen in the last few weeks
- Lime sludge added to the effluent headspace of Cells 2, 3, and 4.

5-28-03

- Cell 4 – Input flowmeter discharging at .2 GPM . Several crayfish were discharge during the flushing of the pipes.
- Less than one inch of rain fell at the site the previous day. Over 8 inches of rain fell in Broward that day.

5-30-03

- Office insulation completed.
- Cell 3 reflooding started.
- Input flowmeters rinsed and cleaned
- Continued sloughing of Cell 2 mat.

6-02-03

Cell 3 flooding completed and floating cattails removed

Cell 2 Size of Individual Chara

Distance from input (feet)	Size of Chara
7	Medium
14	Medium
55	Large
60	Small
81	Medium
83	Small
90	Small

Size definition – Small - up to 4 inch diameter; Medium – 4-7 inches in diameter; Large – 7-12 inches

6-03-03

- Cell 3 YSI has been not been transmitting since 7:00 AM on 4-30-03.
- Problem is not related to YSI after testing. No breakages in transmission/power cable found.

6-06-03

Cell 1 – Percent Cover of *Bacopa sp.*

Distance from Input (feet)	Percent Cover of <i>Bacopa sp.</i>
0-5	0
5-10	3
10-15	2
15-20	>1
20-25	>1
25-30	>1
30-35	1
35-40	>1
40-45	1
45-50	20
50-55	1
55-60	>1
60-65	>1
65-70	>1
70-75	0
75-80	0
80-85	>1
85-90	>1
90-95	>1
95-98	0

Cell 2 Size of Individual Chara

Distance from input (feet)	Size of Chara
7	Medium
9	Small (3)
14	Medium
55	Large
60	Small
81	Medium
83	Small
90	Small

- C-51 pump pressure adjusted to 15 PSI
- Changes to plumbing to cells initiated
- Samples collected from ISCO and grab samples

Data has been collected for more than 80 parameters every 15 minutes. However, the data at this time has not been summarized. The data has been stored on the computer located at the STA-1E PSTA facility. Kevin Locher and Associates is currently developing the software to automatically tabulate and graph the data and post it on the Environmental Branch web page. At this time we are about 2 months way from having all this data available. Jeff Rhodes will manually download the data and extract the rainfall data. The rainfall data will be available on the 16 of July. In the interim we have summarized the average rainfall for STA-1W. As noted the average does not vary more than .13 inches per day + or - . Therefore for a typical week the most dilution water from rain would be approximately .9 inch. That equates to approximately 1/12 of the volume for Regime # 2 and 1/6 for Regime # 1. In the natural system this dilution factor would be advantageous to the treatment effort.

		<i>Evapotranspiration</i>		<i>Rainfall</i>	<i>Net Precipitation</i>
Month	Year	<i>mm/day</i>	<i>inches/day</i>	<i>inches/day</i>	<i>inches/day</i>
May	2002	5.29	0.21	0.08	(0.13)
June	2002	3.55	0.14	0.25	0.11
July	2002	4.11	0.16	0.21	0.05
August	2002	3.89	0.15	0.17	0.02
September	2002	3.73	0.15	0.08	(0.07)
October	2002	3.33	0.13	0.13	(0.00)
November	2002	2.72	0.11	0.10	(0.01)
December	2002	2.25	0.09	0.06	(0.03)
January	2003	2.77	0.11	0.02	(0.09)
February	2003	3.21	0.13	0.02	(0.11)
March	2003	3.61	0.14	0.21	0.06
April	2003	4.14	0.16	0.07	(0.09)
Yearly Average		3.55	0.14	0.12	(0.02)